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SOME ASPECTS

OF THE

VACCINATION QUESTION.

BY

ROBERT CORY, M.A., M.D.

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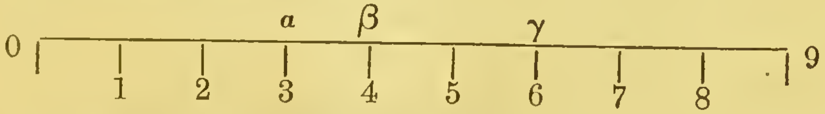
Primary Vaccination.

We regard vaccination in the human subject as effecting a progressive modification of the organism which may be represented diagrammatically thus:



Let the line 0—9 represent the period intervening between insertion of lymph on the occasion of the vaccination of a person, and full protection against smallpox (or further vaccination) resulting therefrom. Let the line be divided into nine equal portions, representing the several days of this period.

At zero an unvaccinated infant is altogether unprotected against smallpox; at the other end, after nine days it is, if efficiently vaccinated during the first day, completely protected against that disease.

Now, Marson laid down as law, and it has come to be generally accepted, that the normal period of incubation of smallpox is twelve days. He went so far, indeed, as to affirm that if you vaccinate a person who has been incubating smallpox for about three days but less than four days, you do not prevent that person suffering from smallpox though you modify the gravity of his attack. Further, Marson affirmed that if you vaccinate a person who has been incubating smallpox for more than four days you do not prevent him suffering smallpox as badly as if he had never been vaccinated at all.

We altogether believe this creed of Marson's, having witnessed not a few cases behaving in obedience to his law. Accordingly we have marked on the above line the end of the third and fourth days, which are especially important days, by the Greek letters α and β; and we have further marked the sixth day with the letter γ for a reason which will presently appear.

Every vaccinated person may be regarded as tending, subsequent to his vaccination, to lose more or less slowly the fulness of the protection acquired on the ninth day, and as tending slowly to retrace his steps backward along our line towards the zero from which he started when he was vaccinated. Thooretically, we may consider him in his retrograde progress as becoming successively once more susceptible to vaccination at γ, to mere attack by smallpox at β, and to unmodified smallpox at α. In other words, he will at the point γ be susceptible if revaccinated, though if revaccination be neglected he will not at this stage of his retrogression take smallpox; at β he will take modified smallpox while on reaching α he is liable to smallpox unmodified by his previous vaccination.

There are, however, several reasons why all persons do not retrace their steps towards zero of our line with equal rapidity, some of which we will enumerate.

Differences in the amount of the original vaccination of one person from another will account for much of the difference in the pace by which they retrograde towards zero. One person who has been vaccinated in four or five places of average size tends to retrograde much more slowly than another of like age vaccinated at the same time in only one place of similar size. Hence, among persons of equal age, the greater liability of those who have been badly vaccinated to attack by smallpox.

Another factor of rapid retrogression is the use of vaccine lymph of inferior quality, lymph, for instance, which has been carelessly selected in vaccination during several successive weeks, or which, as is more common, has been taken again and again from faulty or irregular vesicles owing to limitation of choice from paucity of vaccinifers. In either case the lymph stock steadily deteriorates. The chief characteristic of lymph degenerating from such causes is the tendency to early development of the areola about the vesicles, that is of vesicles which possess very marked areolæ on the morning of the eighth day, or even earlier, instead of on the ninth day. Persons vaccinated with deteriorated lymph of this class unquestionably return to their prevaccinated condition much earlier than persons vaccinated with thoroughly sound lymph.

A third factor is "individual peculiarity," a convenient phrase which cloaks much ignorance. In the present connection, however, a definite meaning attaches to it; for persons, and especially persons of the same parentage, have been known to be severely attacked a second and even a third time by smallpox. This has to be borne in mind in that which follows.

REVACCINATION.

Our views respecting revaccination are broadly these: given a person successfully vaccinated in infancy and conveyed thereby to the safe end of our line. He has in a given period of years retrograded along the line to, say, the point γ. If he be now revaccinated he will not of course have so far to travel again in regaining the safe end of our line as on the occasion of his infantile vaccination. Accordingly we should suspect his revaccination to run a much more rapid course than did his primary vaccination. And this is precisely what occurs; the areola in revaccination invariably makes its appearance at an earlier and sometimes at a much earlier date than in primary vaccination. Further, we believe that, other things being equal, the date of the appearance of the areola in revaccination is a sure index of the stage of backward travel attained by the person operated on, and, roughly, that the shorter the distance retraced towards zero the earlier the areola of revaccination. Hence, we consider that by the behaviour of a revaccination we are able in a particular instance to judge whether and when a further future vaccination of the individual is advisable.

In illustration we will suppose a lad, duly vaccinated in infancy has (without suffering smallpox) attained the age of fifteen and that his vaccination was successful as regards four insertions, the resulting areola reached its height on the sixth day after vaccination and was declining by the eighth day when the lad was inspected. In such a case we may believe the lad at fifteen years of age to have retrograded on our line to about the point β, and should consider him at this time to be liable to an attack of modified smallpox. Further, we should believe that, in so far as his primary vaccination had not protected him for fifteen years, neither would his revaccination protect him for fifteen years, and should therefore advise a third vaccination at the end of ten years. But if in this lad's case the areola had developed on the fourth instead of on the sixth day we should regard him as having receded in the fifteen years since his primary vaccination to about the point γ on our line and should consider him, if now revaccinated, as safe against attack for at least an additional fifteen years instead of ten years.

In view of the above considerations certain experiments of our own become interesting and we believe receive their interpretation.

We have vaccinated an infant by a single insertion repeated day by day for eleven days with lymph preserved in eleven tubes all taken at one time from the same source. The results were curious. The duration of the vaccine disease in this case was in no way prolonged; the ninth day was the day of acme of all the successful insertions, and of insertions made on and after this day not one was in the least degree successful. On the ninth day then, but no sooner, had the system of this infant completed that modification which rendered it immure against vaccination. And it is especially noteworthy that the vaccination insertion of the fifth day hurried through its course like a revaccination, and in five days (the ninth day reckoned from the insertion of the first day) had, like the others, reached its acme and with them commenced at once to fade..

Other experiments which we have made, and which receive light from the above view, are those published in vol. iv, p. 147, of the 'Transactions of the Epidemiological Society.' There details are given, but here we may just shortly restate their general purport. Children possessed of supernumerary fingers were vaccinated by a single insertion of lymph upon the supernumerary finger, and this finger was amputated, together with the vaccine vesicle, on a varying number of days, after the vaccination; and these children were further vaccinated on the arm in the ordinary way a month after the finger was removed. The vaccination done on the arms one month after, resembled revaccinations, and they may be explained by supposing the vaccine disease to have been arrested absolutely by the amputation, and that when they were again vaccinated a month afterwards the vaccine disease had not so far to travel to reach the ninth day, so that it hurried through its course like a revaccination. For instance, we removed a finger on the fifth day after we had vaccinated it; we again vaccinated the child on the arm and this vaccination exactly resembled a revaccination. We may suppose, therefore, it was arrested on the fifth day, and that when we again vaccinated it it took up the disease at the fifth day and did not begin afresh, thus having only a short distance to travel along the imaginary line before it reached complete protection.

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